



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/536,455	05/25/2005	Bernard Resiak	Q87902	6474
23373	7590	09/21/2009	EXAMINER	
SUGHRUE MION, PLLC			FOGARTY, CAITLIN ANNE	
2100 PENNSYLVANIA AVENUE, N.W.				
SUITE 800			ART UNIT	PAPER NUMBER
WASHINGTON, DC 20037			1793	
			MAIL DATE	DELIVERY MODE
			09/21/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/536,455	RESIAK ET AL.	
	Examiner	Art Unit	
	CAITLIN FOGARTY	1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 03 June 2009.
 2a) This action is FINAL. 2b) This action is non-final.
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 10, 13, 14 and 17-24 is/are pending in the application.
 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
 5) Claim(s) _____ is/are allowed.
 6) Claim(s) 10, 13, 14 and 17-24 is/are rejected.
 7) Claim(s) _____ is/are objected to.
 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
 10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ . |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____. | 6) <input type="checkbox"/> Other: _____ . |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on June 3, 2009 has been entered.

Status of Claims

2. Claims 10, 13, 14, and 17 – 24 are pending where claims 10, 14, 18 – 21, and 23 have been amended. Claims 1 – 9, 11, 12, 15, and 16 have been cancelled.

Status of Previous Rejections

3. The 35 U.S.C. 103(a) rejection of claims 10 – 17 and 24 as being unpatentable over Bangaru et al. (US 6,228,183) in view of Heitmann et al. (US 5,554,233) has been maintained. **Note: claims 11, 12, 15, and 16 have been cancelled.

The 35 U.S.C. 103(a) rejection of claims 18 – 20 as being unpatentable over Heitmann et al. (US 5,554,233) in view of Bangaru et al. (US 6,228,183) has been maintained.

The 35 U.S.C. 103(a) rejection of claims 21 – 23 as being unpatentable over Heitmann et al. (US 5,554,233) in view of the *ASM Handbook* and further in view of Bangaru et al. (US 6,228,183) has been maintained.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claims 10, 14, 18, and 21 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Instant claims 10, 14, 18 and 21 recite the claim limitation “micro-alloyed low-carbon steel mechanical component.” However, the instant specification does not have literal support for “micro-alloyed.” In addition, instant claims 10, 14, and 18 recite the claim limitation “without final heat treatment.” However, the closest literal support for this limitation is on p. 8 lines 15-17 of the instant specification which recites that “the mechanical components according to the invention are obtained by plastic deformation of rolled products without additional heat treatment of quenching and tempering.” This is not literal support for all forms of heat treatment.

Claim Objections

6. Claim 19 is objected to because of the following informalities: claim 19 contains a typographical error “after *it's* rolling” which should be corrected to “after its rolling.” Appropriate correction is required.

Claim Rejections - 35 USC § 103

7. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
8. Claims 10, 13, 14, 17 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bangaru et al. (US 6,228,183) in view of Heitmann et al. (US 5,554,233).

With respect to instant claims 10, 14, and 24, col. 1 lines 9-16, col. 5 lines 13-25 and claims 1 and 2 of Bangaru disclose a micro-alloyed low-carbon steel with an overlapping or close composition as seen in Table 1 below.

Table 1

Element	Instant Claim 10, 14, 24 (weight %)	Bangaru et al. (weight %)	Overlapping Range (weight %)
C	> 0.10 – < 0.15	0.03 – 0.10	Close
Nb	0.04 – 0.10	0.01 – 0.10	0.04 – 0.10
B	0.001 – 0.005	0.0005 – 0.0020	0.001 – 0.002
Mo	0.15 – 0.35	0.2 – 0.5	0.2 – 0.35
Mn	1.3 – 2.0	1.6 – 2.1	1.6 – 2.0
Si	0.15 – 1.30	0 – 0.6	0.15 – 0.6
Al	0.01 – 0.08	0 – 0.06	0.01 – 0.06
N	≤ 0.015	0.001 – 0.006	0.001 – 0.006
Ti	≥ 3.5 x %N	0.005 – 0.03	Meets conditions of claim 1
Fe + Impurities	Balance	Balance	Balance
Cu	----	0 – 1.0	0
Ni	----	0 – 1.0	0
V	----	0.01 – 0.10	----
Cr	----	0 – 1.0	0
Ca	----	0 – 0.006	0
REM	----	0 – 0.02	0
Mg	----	0 – 0.006	0

Although the composition of C in the steel disclosed by Bangaru does not overlap with the composition of C in the steel recited in the instant claims, the composition of 0.10

wt% C disclosed by Bangaru is very close in value to the composition of greater than 0.10 wt% C recited in the instant claims and therefore the steel of Bangaru would be expected to have the same properties as the steel of the instant claims. A *prima facie* case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough that one skilled in the art would have expected them to have the same properties. *Titanium Metals Corp. of America v. Banner*, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985). See MPEP 2144.05.

In addition, Bangaru teaches that the low-carbon steel alloy can be used to fabricate linepipe which is a mechanical component and therefore the alloy is ready-for-use. Bangaru also teaches that the steel alloy has a tensile strength of at least about 900 MPa which satisfies the limitation of claims 10 and 14 of a tensile strength greater than 800 MPa. Bangaru also discloses that the steel alloy has a microstructure comprising about 50 vol% to less than 90 vol% fine-grained lower bainite, fine-grained lath martensite, or mixtures thereof which satisfies the limitation of claims 10 and 14 that the alloy has essentially bainitic structure.

Claims 10 and 14 are product by process claims and even though product by process claims are limited by and defined by the process, determination of patentability is based on the product itself. See MPEP 2113. Therefore, the process limitations of claims 10 and 14 do not have patentable weight. However, the structure implied by the process steps has been considered.

Bangaru differs from instant claims 10 and 14 because it does not teach that the steel product is a wire or rod. However, Heitmann teaches a steel composition similar

to that of Bangaru. Therefore, in order to obtain the desired shape of a rod, it would have been obvious to one of ordinary skill in the art to use the steel composition of Bangaru in the method of Heitmann for making a rod (see col. 2 line 58-col. 3 line 42 of Heitmann) in order to obtain a desired shape of the final product.

Claims 13 and 17 further limit the composition of molybdenum to ≤ 0.30 wt% and the composition of manganese to < 1.80 wt%. Both of the recited composition limitations still overlap with the compositional ranges disclosed in Bangaru of Mo: 0.2 – 0.5 wt% and Mn :1.6 – 2.1 wt%.

Since the claimed compositional ranges of claims 10, 13, 14, 17, and 24 either overlap, are close, or are within the ranges disclosed by Bangaru, a prima facie case of obviousness exists. See MPEP 2144.05. It would have been obvious to one of ordinary skill in the art at the time the invention was made to select the claimed low-carbon steel alloy composition from the steel composition disclosed by Bangaru because Bangaru teaches the same utility (i.e. a mechanical component with an essentially bainitic structure) in the whole disclosed range.

9. Claims 18 – 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Heitmann et al. (US 5,554,233) in view of Bangaru et al. (US 6,228,183).

With respect to instant claim 18, col. 2 line 55-col. 3 line 42 and col. 7 lines 41 – 67 of Heitmann teach a process for manufacturing a ready-for-use micro-alloyed low-carbon steel mechanical component with elevated characteristics exhibiting a tensile strength at break of at least about 827 MPa (see col. 8 lines 9-12) which is within the range recited in instant claim 18. The process comprises starting from a billet (long

semi-finished product) and then hot rolling the billet in the austenitic range into a bar.

Heitmann refers to the product as a bar, however the bar has a diameter and is therefore in a rod shape and satisfies the limitation of instant claim 18. After the hot rolling is complete, the rod is air cooled to ambient temperature to provide it with an essentially bainitic structure (col. 3 lines 17-21 of Heitmann). Finally, the rod is worked by cold plastic deformation into its final shape without final heat treatment.

Heitmann differs from instant claim 18 because it does not teach a low-carbon steel component with an overlapping composition with that of the instant claim.

However, col. 1 lines 9 – 16, col. 5 lines 13 – 25 and claims 1 and 2 of Bangaru disclose a micro-alloyed low-carbon steel with an overlapping or close composition as shown in

Table 2 below.

Table 2

Element	Instant Claim 18 (weight %)	Bangaru et al. (weight %)	Overlapping Range (weight%)
C	> 0.10 – < 0.15	0.03 – 0.10	Close
Nb	0.04 – 0.10	0.01 – 0.10	0.04 – 0.10
B	0.001 – 0.005	0.0005 – 0.0020	0.001 – 0.002
Mo	0.15 – 0.35	0.2 – 0.5	0.2 – 0.35
Mn	1.3 – 2.0	1.6 – 2.1	1.6 – 2.0
Si	0.15 – 1.30	0 – 0.6	0.15 – 0.6
Al	0.01 – 0.08	0 – 0.06	0.01 – 0.06
N	≤ 0.015	0.001 – 0.006	0.001 – 0.006
Ti	≥ 3.5 x %N	0.005 – 0.03	Meets conditions of claim 18
Fe + impurities	Balance	Balance	Balance
Cu	---	0 – 1.0	0
Ni	---	0 – 1.0	0
V	---	0.01 – 0.10	---
Cr	---	0 – 1.0	0
Ca	---	0 – 0.006	0
REM	---	0 – 0.02	0
Mg	---	0 – 0.006	0

Art Unit: 1793

Although the composition of C in the steel disclosed by Bangaru does not overlap with the composition of C in the steel recited in the instant claim, the composition of 0.10 wt% C disclosed by Bangaru is very close in value to the composition of greater than 0.10 wt% C recited in the instant claim and therefore the steel of Bangaru would be expected to have the same properties as the steel of the instant claim. A prima facie case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough that one skilled in the art would have expected them to have the same properties. Titanium Metals Corp. of America v. Banner, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985). See MPEP 2144.05. Heitmann teaches a steel composition similar to the steel composition of Bangaru. Therefore, it would have been obvious to one of ordinary skill in the art to substitute the steel composition of Bangaru in the method of Heitmann in order to obtain a desired rod shape rather than a steel plate shape.

In regards to instant claim 19, col. 3 lines 10 – 16 of Heitmann disclose that the removal temperature of the rod after rolling is 780-855°C which is within the recited range of below 1000°C.

Regarding instant claim 20, col. 6 lines 52-62 of Heitmann teach that the cooling rate can be 4-8°C/s which is above the minimum of 1°C/s recited in instant claim 20.

Since the claimed compositional ranges of claim 18 either overlap, are close, or are within the ranges disclosed by Bangaru, a prima facie case of obviousness exists. See MPEP 2144.05. It would have been obvious to one of ordinary skill in the art at the time the invention was made to select the claimed low-carbon steel alloy composition

from the steel composition disclosed by Bangaru because Bangaru teaches the same utility (i.e. a mechanical component with an essentially bainitic structure) in the whole disclosed range.

10. Claims 21 – 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Heitmann et al. (US 5,554,233) in view of the *ASM Handbook* and further in view of Bangaru et al. (US 6,228,183).

With respect to instant claim 21, col. 2 line 55-col. 3 line 42 and col. 7 lines 41 – 67 of Heitmann teach a process for manufacturing a ready-for-use micro-alloyed low-carbon steel mechanical component with elevated characteristics exhibiting a tensile strength at break of at least about 827 MPa (see col. 8 lines 9-12) which is within the range recited in instant claim 21. The process comprises starting from a billet (long semi-finished product) and then hot rolling the billet in the austenitic range into a bar. Heitmann refers to the product as a bar, however the bar has a diameter and is therefore in a rod shape and satisfies the limitation of instant claim 21. After the hot rolling is complete, the rod is air cooled to ambient temperature to provide it with an essentially bainitic structure (col. 3 lines 17-21 of Heitmann). Finally, the rod is worked by cold plastic deformation into its final shape without final heat treatment.

Heitmann differs from instant claim 21 because it does not teach the hot-rolled rod is subject to plastic transformation by forging at a temperature of about 1200°C or more to bring it to the final desired shape and then thermally treated by quenching at a cooling rate sufficient to provide it with a bainitic or essentially bainitic structure through to the core. However, the process step of subjecting a hot-rolled rod to forging at a

Art Unit: 1793

temperature of a maximum of 1290°C to create a final desired shape is well known in the art as evidenced by p. 81 and 218-221 of Volume 14 of the 1988 9th Edition *ASM Handbook*. The *ASM Handbook* also teaches the step of quenching in order to obtain the desired physical properties. Therefore, it would have been obvious to one of ordinary skill in the art to incorporate the method steps of the *ASM Handbook* in the method of Heitmann as an alternative method for creating a desired shape of a low-carbon steel alloy with an essentially bainitic structure and a tensile strength at break of more than 800 MPa.

Heitmann also differs from instant claim 21 because it does not teach a micro-alloyed low-carbon steel component with an overlapping composition with that of the instant claim. However, col. 1 lines 9 – 16, col. 5 lines 13 – 25 and claims 1 and 2 of Bangaru disclose a micro-alloyed low-carbon steel with an overlapping or close composition as shown in Table 3 below.

Table 3

Element	Instant Claim 21 (weight %)	Bangaru et al. (weight %)	Overlapping Range (weight%)
C	> 0.10 – < 0.15	0.03 – 0.10	Close
Nb	0.04 – 0.10	0.01 – 0.10	0.04 – 0.10
B	0.001 – 0.005	0.0005 – 0.0020	0.001 – 0.002
Mo	0.15 – 0.35	0.2 – 0.5	0.2 – 0.35
Mn	1.3 – 2.0	1.6 – 2.1	1.6 – 2.0
Si	0.15 – 1.30	0 – 0.6	0.15 – 0.6
Al	0.01 – 0.08	0 – 0.06	0.01 – 0.06
N	≤ 0.015	0.001 – 0.006	0.001 – 0.006
Ti	≥ 3.5 x %N	0.005 – 0.03	Meets conditions of claim 21
Fe + impurities	Balance	Balance	Balance
Cu	---	0 – 1.0	0
Ni	---	0 – 1.0	0
V	---	0.01 – 0.10	---

Art Unit: 1793

Cr	---	0 – 1.0	0
Ca	---	0 – 0.006	0
REM	---	0 – 0.02	0
Mg	---	0 – 0.006	0

Although the composition of C in the steel disclosed by Bangaru does not overlap with the composition of C in the steel recited in the instant claim, the composition of 0.10 wt% C disclosed by Bangaru is very close in value to the composition of greater than 0.10 wt% C recited in the instant claim and therefore the steel of Bangaru would be expected to have the same properties as the steel of the instant claim. A prima facie case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough that one skilled in the art would have expected them to have the same properties. Titanium Metals Corp. of America v. Banner, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985). See MPEP 2144.05. Heitmann teaches a steel composition similar to the steel composition of Bangaru. Therefore, it would have been obvious to one of ordinary skill in the art to substitute the steel composition of Bangaru in the method of Heitmann in view of the *ASM Handbook* in order to obtain a desired rod shape rather than a steel plate shape.

In regards to instant claim 22, col. 3 lines 10 – 16 of Heitmann disclose that the removal temperature of the rod after rolling is 780-855°C which is within the recited range of below 1000°C.

Regarding instant claim 23, col. 6 lines 52-62 of Heitmann teach that the cooling rate can be 4-8°C/s which is above the minimum of 1°C/s recited in instant claim 23.

Since the claimed compositional ranges of claim 21 either overlap, are close, or are within the ranges disclosed by Bangaru, a prima facie case of obviousness exists.

See MPEP 2144.05. It would have been obvious to one of ordinary skill in the art at the time the invention was made to select the claimed low-carbon steel alloy composition from the steel composition disclosed by Bangaru because Bangaru teaches the same utility (i.e. a mechanical component with an essentially bainitic structure) in the whole disclosed range.

Response to Arguments

11. Applicant's arguments filed June 3, 2009 have been fully considered but they are not persuasive.

Arguments are summarized as follows:

The claimed process is completely opposite to Bangaru. Bangaru teaches that a hard forced cooling (i.e. a quenching) of the steel (which is here a steel plate, then not a long steel product as the object of the invention) is necessary to obtain the desired bainite microstructure which is known to be able to give the final steel product with the desired properties. Due to the claimed steel composition, a forced cooling of the hot rolling laminated long steel product having the claimed composition is not necessary, nor recommended, after its hot rolling the in the austenitic area to obtain the desired microstructure of bainite given the desired properties on the final piece ready for use. With the claimed steel composition, the ferrite + pearlite area does not exist. Only the desired bainitic domain is present. Furthermore, Applicant cited "New Bainitic Steels for High Strength Components for Automotive Parts" to show that the steel grade of

the claimed invention permits the by-pass of several steps of the classical way of working mechanical components.

Examiner's responses are as follows:

As seen in the above rejections, the Examiner has relied on Heitmann as prior art for the process claim limitations, not Bangaru. The product claims 10, 13, 14, and 24 were rejected as being unpatentable over Bangaru in view of Heitmann. Bangaru was relied on as prior art that teaches a steel composition that overlaps with the composition of the instant steel and has an essentially bainitic microstructure as discussed above. Bangaru does not teach that the steel product is a wire or rod. Therefore, the Examiner's position is that since Heitmann teaches a steel composition similar to that of Bangaru, it would have been obvious to one of ordinary skill in the art to substitute the steel composition of Bangaru in the method of Heitmann for making a rod in order to obtain a desired shape of the final product. Furthermore, claims 10 and 14 are product by process claims and even though product by process claims are limited by and defined by the process, determination of patentability is based on the product itself. See MPEP 2113. Therefore, the process limitations of claims 10 and 14 do not have patentable weight. However, the structure implied by the process steps has been considered as seen in the above rejection.

In regards to the process claims 18 – 20, the Examiner takes the position that these claims are unpatentable over Heitmann in view of Bangaru as discussed above.

Regarding the process claims 21 - 23, the Examiner takes the position that these claims are unpatentable over Heitmann in view of the *ASM Handbook* and further in view of Bangaru as discussed above.

Conclusion

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to CAITLIN FOGARTY whose telephone number is (571)270-3589. The examiner can normally be reached on Monday - Friday 8:00 AM - 5:30 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Roy King/
Supervisory Patent Examiner, Art
Unit 1793

Application/Control Number: 10/536,455
Art Unit: 1793

Page 15

CF